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FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

March, 1930.

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FOREWORD

CLEARNESS OF STATEMENT

"Technical Writing " by T. A. Rickard is not the latest work on this subject, but it is a very readable book and a very helpful one. Not the least thing in its favor is that the book is dedicated to George McLane Wood, for many years editor of the Geological Survey, who, directly and indirectly, has done more to raise the literary standard of Government reports than any other one agency. One of the early chapters in "Technical Writing" is concerned with clearness. Some excerpts may be helpful to all of us:

The notion prevails that writing is a knack, that the skilful use of the pen is a gift of nature. This is an error. Dogberry may be responsible for it; he said: "To be a well-informed man is the gift of fortune, but to write and read comes by nature." Because Dogberry said it, we may be sure that Shakespeare thought otherwise. The larger part of the great writing in our literature is the result of persistent effort. An easy fluency has been the undoing of many; their flamboyant and fantastic scribbling has proved as perishable as froth.

This criticism applies to technical writing also; in order that a technical description or discussion may hold the interest of the reader, at least long enough to cause him to read it to the end, the writing must be done carefully and systematically; otherwise it will fail in its purpose of conveying information. Clearness is absolutely essential. "It is not enough to use language that may be understood; it is necessary to use language that must be understood."

The purpose of writing, at least of that which is meant to be read by others, is not only to express ideas but to communicate them. Lack of perspicuity may prove as bad as untruthfulness. J. H. Finley, in his preface to George Crabb's 'English Synonyms', says advisedly: "For there be three classes of men who do not tell the truth except by accident; first, those who do not know it; second, those who wish not to tell it; and third, those who do not know how to tell it."

From first to last, REMEMBER THE READER: that is a rule never to be forgotten in any kind of writing except the diary. The diarist can shoot his words into the air; yours are aimed at the intelligence of a sympathetic human being. Consider him; if you do, you will escape half the pitfalls awaiting you.

Clearness of statement depends, first, on the choice of words; next, on the order in which they are arranged; then, on the sequence of clauses composing a sentence; and, finally, on the arrangement of sentences in a paragraph.

(Over)

Avoid words you do not know fore and aft. Do not be tempted into the use of high-sounding terms that frequently are employed to cover ignorance. Comprehensive words like 'development' and 'evolution' are often mere noise and smoke, not penetrating shot.

If you do not know how to characterize something you have seen, do not imagine you have done your duty when you have labeled it a "phenomenon". That is a generic term conveying to the scientific mind the idea of an observed fact, especially with relation to what is subject to change, as opposed to the essence of things; in a loose and popular acceptation it carries an impression of the unfamiliar; in either case the label "phenomenon" explains nothing. Macaulay said: "I have often observed that a fine Greek compound is an excellent substitute for a reason."

The rule is to use the word that will be understood by the reader and at the same time best expresses the meaning. "Too many cooks spoil the broth" is a simple statement, which 'Punch' transformed jocularly into "A superfluity of culinary assistance is apt to exercise a detrimental effect upon the consomme". That is the language of a newspaper reporter.

Do not hesitate to define a term the meaning of which may be doubted. When you do so, avoid the use of terms that themselves need to be explained. As Samuel Johnson said: "To explain, requires the use of terms less abstruse than that which is to be explained, and such terms cannot always be found. For as nothing can be proved but by supposing something intuitively known, and evident without proof, so nothing can be defined but by the use of words too plain to admit of definition."

As Sir James J. Thompson has said: "If you want to arrive at intelligible issues - not to say conclusions - in any discussion, begin by settling the meaning of the terms you are going to use."

Do not define in terms that need to be defined; do not spare definitions. Many technical articles lead nowhere, simply because the writer has not made it clear whither he is driving. To discuss the persistence of ore in depth, for example, is hopeless unless the principal terms, "ore" and "depth", are defined. Definitions tend to clear the thought of the writer no less than they clarify the understanding of the reader.

Of William James, the philosopher, whose letters have been published recently, it is said that to him writing was "a mode of communication, rather than of objectivation." He was intimate and personal. "I don't care how incorrect language may be", he said, "if it only has fitness of epithet, energy, and clearness." He seems to have been intensely conscious of the person to whom he was writing,

and exerted himself to conquer the understanding and win the sympathy of that person. He depicted his ideas and fitted them to the minds of his readers. The allusion to "incorrect language" is needlessly disarming, for when a writer selects his epithets with skill, puts the pulse of life into his periods, and makes his meaning clear, he has achieved the correctness of language for which we strive continually.

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FOREST EXPERIMENT STATIONS

APPALACHIAN FOREST EXPERIMENT STATION

North Carolina Tax Study

The tax study is being begun in North Carolina this spring. Three counties - Bertie, Chatham and Macon - have been chosen as representative of the coastal plain, piedmont and mountain regions of the state, and will be studied intensively. The estimation of the rate of growth of stands of timber on forest lands is a troublesome part of the tax inquiry work. R. C. Hall, from the New Haven office of the inquiry, Professor P. W. Wager of the University of North Carolina, who will have charge of the work in this state, and R. B. Thomson, Assistant Forest Economist, who will work with him, spent two days with the men at the station outlining the procedure for obtaining the data necessary as a basis for this estimate. The work is to be begun in the eastern part of the state and Korstian will meet Thomson in the field to confer with him after the plans outlined have been tried out. It is felt that the methods used in the mountains will differ considerably from those used in the Coastal Plain. Since the estimate must of necessity be arrived at without too great cost, and therefore cannot be exact, it was decided to disregard difference in site in the Coastal Plain section (except as site is reflected in type differences) and to concentrate efforts on a determination of stand ages and densities over the county to be studied. In the mountains, on the other hand, site is all-important, and past work indicates that differences in rates of growth of the various hardwood species can be neglected in general yield studies. Here it will be necessary to make site determinations in addition to estimates of ages and densities of stands.

Plans for Bent Creek Experimental Forest

Work in the mountains during the coming summer field season is to be concentrated at Bent Creek. Several new experiments, chiefly in methods of cutting, will be started. The treatments are to be arranged in series, and an effort will be made to plan the work on the forest in such a way that related experiments can be compared and sequences easily followed.

Damage from The 1925 Drought

Two upper slope areas in the Bent Creek forest, selected by F. W. Haasis, were placed under observation in September 1925, following the severe summer drought of that year. A number of trees were

tagged and described at the time of the drought and records of their subsequent vigor taken two or three years later. Soil conditions were observed at the height of the drought season and comparative observations made the following year. These soil observations indicated that moisture content was reduced during the drought considerably below the minimum for available water in the soil. Final observations on these areas have been made by Hursh, and the results have been written up for publication.

Of the tagged trees within the areas not a single tree that maintained normal foliage during the drought period showed any evidence of injury during the succeeding four years, that could be attributed to the drought. Of the trees showing definite drought injury at the time of tagging (September, 1925,) about one-half of the number completely recovered. The remainder sustained injury in the form of dead branches in the crown, or were killed either by the drought or by secondary causes.

There were marked differences in response to drought conditions among the oaks. The leaves of chestnut oak were only moderately or slightly injured during the drought. Trees of this species were quite normal the following spring. No permanent injury could be attributed directly to the drought condition. Black oak showed severe leaf injury during the drought period and all of the trees of this species were dead by 1929. With few exceptions red oak and scarlet oak responded similarly to black oak. The hickory species present - mockernut, pignut, and shagbark - were only slightly injured during the drought period. In most cases recovery among the hickories was complete.

Extensive root excavations were impractical because of rock obstructions, but it seemed likely that root restriction due to rock out-crops or to shallow soil in rock pockets was the significant factor responsible for the drought injury. The soil throughout the areas under observation was shallow, frequently being less than 18 inches in depth. During normal seasons such soils support a heavy vegetation due partly to the ground water moving from above, as the topography is relatively steep. In periods of drought, however, where there is no movement of ground water, these thin soils dry out rapidly and injury to the vegetation is a natural result.

Meterological studies have established the fact that fluctuations from the normal have frequently occurred in the Southern Appalachians and indicate that drought periods are to be expected in the future.

Test of Species for Planting

The weather on Mt. Mitchell is always capricious. Sims went up to the test area planting site on the first day of spring to put

in a few hundred trees, but was driven off the mountain by a blizzard. The planting site is between 5,000 and 6,000 feet in elevation and it is usually difficult to get a chance to plant up there before stock taken up at Asheville has budded out so much that it is likely to be injured at the higher altitude. Larch has been so much damaged by the late frosts on the mountains that it has not been possible to establish a plantation of it. Last fall the larch stock to be planted out this spring was heeled in near the planting site. Sims reports that its buds are still dormant while the larch at Asheville's elevation is beginning to leaf out.

Biological Investigations

Burleigh has found that the cold weather of March slowed up bird migration in the vicinity of Asheville. Lone individuals of such species as the sap sucker and Louisiana water thrush have been noticed but the main migration has been slow. Burleigh has also been studying the altitudinal migration of birds up Mt. Mitchell, and has found that birds which winter at low elevations go only gradually to higher elevations, so that the migration season is a month later at 6,000 feet than it is at 2,500 feet, the elevation of Asheville.

An acre on a dry, open pine-oak slope at Bent Creek which Hursh is to use in a burning experiment, was trapped for rodents during March. The results are interesting. Thirty traps, calculated to catch rodents up to woodchuck size, were set on March 15, but to date one common peromyscus has been the only catch. A couple of check areas in the bottom of a draw where there is considerable undergrowth were trapped, using the same sort of bait. Here 10 rodents (8 peromyscus, 1 microtos, 1 shrew) were caught in two weeks. The indication seems to be that rodents do not frequent the open slopes so much as the bushier valleys, and it may be that a greater share of the acorn crop is taken by deer and other larger mannals than has been supposed heretofore.

In fact it begins to be apparent that the rodent population at Bent Creek is unusually small. This is perhaps due to an abnormally large predacious population. Since January 1, 15 skunks, 12 grey foxes, and 8 oppossums have been taken on the Bent Creek/Forest and in its vicinity - an area probably not exceeding 2,000 acres. Burleigh has also noted a scarcity of hawks and owls at Bent Creek, and he assumes that since they are not shot on this area, which is a National game preserve, their scarcity may be due to the excess of predatory animals which consume so large a share of the rodent population on which these birds depend for a living. Again, the predators may account for a scarcity of grouse and turkey on the area.

Several of the plantations at Bent Creek show considerable damage from browsing, apparently by deer which are present in great numbers all over the game preserve.

A representative of the DuPont Company who is concerned with wild life conservation and game propogation in the southern states went over the station's work in forest biology during the month. He is anxious to plant ring neck pheasants in this region. Heretofore they have not been successfully introduced in the South, but it is felt that at Bent Creek, where the altitude makes climate favorable and where protection is rigid, the chances of success should be great.

The station's activities will be further advertised through a Pathe news reel sound picture, the central figure in which will be Burleigh posed before the camera and microphone at a table set in the woods and spread with specimens of local mammals and birds. While he skinned a flicker and prepared it for mounting, he talked about the relation of birds and mammals to the forest. During the month he also made addresses to the Boy Scouts and the Asheville Woman's Club.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

During the month the first general conservation meeting was called in Ohio by the Governor. All agencies interested in the various phases of this subject were well represented at the meeting.

Assistance has been rendered the Columbus Boy Scout Organization by several mambers of the staff in directing planting work at their camp north of Columbus. The Scout Organization is fortunate in having several hundred acres of land which include open field suitable for planting. The planting stock used in this instance has been furnished from the Ohio State nurseries but was grown several years in transplant beds at the Scout camp. Scotch pine, red pine, Norway spruce, Corsican pine, white pine and European larch are included among the plantings.

An area planted a year ago to Scotch pine has suffered somewhat from injury by rabbits, which have in a few cases eaten the leader from Scotch pine trees. Instances in which the side limbs are browsed off are common. This area has been a game preserve for several years and the abundance of rabbits was shown when between 40 and 50 rabbits were seen on an area of about 20 acres. Hardwood seedlings and even berry bushes have been browsed more than the pine.

The lecture on "Planted or Grove Black Walnut" which Kellogg prepared for the Ohio Forestry Association program, was repeated for the benefit of the Lumbermen's Club of Columbus at one of its regular meetings. This lecture contains 74 slides.

Plantation Study (Fp-1)

Kellogg has continued work toward the construction of volume tables for Black Walnut.

It was anticipated that during the past winter opportunity would be found to secure measurements on plantation-grown trees at Urbana, Illinois. It is the plan of the University to cut out considerable portions of the plantations which exist there and to develop the area from a landscaping angle rather than to leave it in grove form. It is regrettable that the University finds it necessary to take this action. Some inroads have already been made on these plantations and room has already been made for the University Hospital. During the current winter funds were used in other activities by the Department of Grounds and consequently the opportunity to secure measurements on planted trees which were felled did not materialize. This, however, is an opportunity which will come again in perhaps the next year or so.

Woodland Grazing (Pa-1)

During the month Day assembled into form for publication his observations on the scarcity of bird life in grazed woodlots. He attributed this to destruction of the lower stratum of the forest by grazing animals, which removes the nesting sites and part of the auxilliary food for bird life of the woods.

Ozark National Forest (Mc-1)

Barrett completed the computation on a study made on the Bear Pen sale area of the Ozark National Forest. The outcome of this study has an important bearing on the management of this type of hardwood forest. Previous to purchase by the Forest Service this area was repeatedly burned over so that no regeneration had opportunity to develop. Seedlings which have started during this period of successive fires, while burned back to the ground, retained a live root system which sprouted each year. Protection of this area from fire resulted in prolific production of sprout hardwood. Barrett found on his study that an average of 3,085 hardwood stems per acre, less than 2.6 inches in diameter breast high, have established themselves through protection from fire on the sale area. While this ample quantity of sprout regeneration contains many poor species there is still an excellent representation of the better species including white oak and black oak. The less favorable aspect of this type of new forest results from frequent fire scarring of the root system at the ground level. Fire damage has been followed by decay infection in approximately one-third of the oak regeneration. Further study will be needed to determine if decay now existing in the roots will continue up into the stem of the trees as they develop heartwood.

The present stand of sprout regeneration is from 7 to 13 years of age while the average age of the root stocks from which this regeneration sprang is approximately four times this amount. In view of this very close stand of sprout hardwood there is little chance for the establishment of seedlings on such areas even if the seed could germinate and the seedlings live through the first few years under suppressed conditions.

Oak Yield Study (Ts-12)

Barrett completed a report on the influence of depth of litter on the germination and survival of chestnut oak acorns.

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LAKE STATES FOREST EXPERIMENT STATION

Striking and satisfactory results have been obtained in the experiments to develop a method of obtaining quick germination of white pine seed from spring sowing. A key has been found which is applicable on a large scale. The best result is obtained by stratifying the seed for from 15 to 30 days before the time of sowing, at a temperature between 32 and 50 degrees F. in a moist medium such as sand, sphagnum or sawdust. In the subsequent separation of the seed the sawdust offers a great advantage. The process of treatment has been worked out fairly closely and the effect is so marked that it will hereafter be applied to all samples for testing and is being recommended for use in nurseries where white pine is sown in the spring.

A conference of the Wisconsin Conservation Commission was called to consider the plans for cooperative investigations with the Station for the coming season. Zon suggested a cooperative sub-station in Northern Wisconsin where the problems of the pulp and paper industry in growing pulpwood would be given special emphasis. The suggestion was well received and subsequent correspondence indicated that there will be several areas from which to select the most suitable one for the purpose. The proposed cooperative investigations of the growth on cut-over pine and swamp lands and of slash disposal were approved and the Conservation Commission will contribute materially to the costs of these two projects. The interest in the slash disposal project is, in part, due to the strong feeling of many recreationists and sportsmen about the unsightly areas of slash which are left after logging and form eyesores in many places in Northern Wisconsin.

The guide to permanent sample plots, suggested sometime ago by one of the forest officers in the Lake States, and containing the

compilation of the more important facts concerning each plot or group of plots has been completed for the eighty-four plots located in various parts of the region. The compilation was begun by Averell late in 1929 and completed by Roe upon the former's transfer from the Station. It has been mimeographed on half-letter size sheets and bound loose-leaf so that new plots and revised information on existing plots may be easily added. Sample plots are arranged numerically by forest groups (Chippewa National Forest 1-39, and so on), and the following topics covered: Description of plots - purpose, size, location, stand, date of remeasurement, reproduction and other counts; Comparison of plots (acre basis) - number of trees, basal area and volume (original, cut, left), treatment and reproduction. A detailed blueprint map for each group of plots is included. Copies will be sent to the forest officers and to others interested in the District.

A conference was held on March 7 at the Station with District Forester Tinker and Messrs. Ramsdell and Hopkins at which the investigative work of the Station and particularly the administrative projects being carried on the National Forests were discussed in some detail. The Station work on the Chippewa, Superior and Huron National Forests has developed to a point where there is justification for assigning a member of the Station to each of these forests to handle the work and live with the problems each field season. Incidentally this arrangement will provide opportunity for a member of the staff to become better acquainted than has heretofore been the case, with the administrative projects under way, and to help in planning and carrying out such projects as may be needed in the future. This arrangement will not, of course, preclude visits by other members of the staff to these forests in connection with their own projects, but most of the work on each forest on whatever projects may be under way will be done under the direction of the resident member of the staff. After this conference the annual investigative report was completed and will shortly be submitted to Washington.

The economic work and Cunningham's objectives were clarified by a visit from Granger the latter part of February. It appears that the first goal should be the strengthening of the work of the existing State Land Economic Surveys in those respects in which they are not obtaining data which can be used for the Federal Forest Survey in this region. The weak points are particularly the inventory of present forest stands and data by which future growth and yield of those stands may be estimated.

Gevorkiantz went to Washington for a detail in the office of forest measurements the middle of February and has not yet returned.

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The staff has given considerable attention to the question of publicity for the work of the station, and how it should be prepared. This matter has also been up for discussion by the Division of Horticulture of the Massachusetts Agricultural College. Westveld served on the Committee reporting the matter. As a result of these discussions the experiment station staff has organized a practice course in news writing under the supervision of Mr. Olson, extension editor of the College. We feel that if each man makes a definite effort to compose news stories on definite features of his work we will improve our proficiency in news writing to a much greater extent than would be possible from simply hearing lectures or studying textbooks.

Westveld has been working on a comprehensive report of the results of the permanent plots at Corbin Park, New Hampshire, on which the understory of spruce was released in 1905 by girdling the hardwood canopy. The finishing touches to this report will be withheld until the close of the present field season so that the figures may include the results of 1930 to complete a twenty-five year period.

Re-mapping of the vegetation quadrats of the Cherry Mountain sample plots has been completed as has most of the office compilation in respect to the 1929 remeasurement of these plots. Jensen has completed the type maps and descriptive memoranda for the Gale River and Bartlett Sub-station areas, and has drawn up a plan with suggestions for completing the field work on the Bartlett area.

Spaulding has spent the past few weeks in routine winter work, organizing notes, collections, and ideas from the past summer's field work, indexing old literature, which for the pathologist is analogous to taking advantage of the old permanent sample plots by the forester, and planning and preparing for the next season's field work.

Stickel has completed a preliminary analysis of the forest fire weather data from Cranberry Lake, New York, and has distributed a series of charts to the state foresters and weather bureau officials showing the relationship of various factors to fire hazard. The data on these charts are summarized in the following tables:

	Generally safe	Slightly dangerous	Moderately dangerous	Dangerous	Highly dangerous	Extremely dangerous
In the Open						
Air tem. Deg. F.	Below 68	68-74	75-78	79-82	83-85	86+
Top Duff Tem. Deg. F.	" 74	74-82	83-91	92-102	103-120	121+
Evap. per hr. c. c.	0-1.3	1.3-1.7	1.8-2.1	2.2-2.6	2.7-3.4	3.5+
Rel. Hum. %	100-58	58-45	44-34	33-23	22-15	14-
Depression Dew Point Degree F.	0-14	14-20	21-27	28-39	40+	
Hours since last trace of rain	0-19	19-35		36-77		78+
Hours since last measurable rainfall	0-35	35-62		63-122		123+
In the Forest						
Air Tem. Deg. F.	Below 84	84-87	88+			
Top. Duff Tem. Deg. F.	" 99	99-111	112+			
Evap. per hr. c. c.	0-2.1	2.1-2.4	2.5-2.8	2.9-3.4	3.5+	
Rel. Hum. %	100-27	27-19	18-			
Depression Dew Point Degree F.	0-31	31-41	42+			
Hours since last trace of rain	0-90	90+				
Hours since last measurable rainfall	0-201	201-264		2.65+		

In these tables the fire hazard is defined by the following zones of inflammability:

Degree of Hazard and Duff Moisture Content	Dangerous Fire Brands
Extreme, below 6 per cent	Cigarettes, locomotive sparks, pipe heels, matches, camp fires.
High, 6 to 10 per cent	Locomotive sparks, pipe heels, matches, camp fires.
Medium, 11 to 16 per cent	Pipe heels, matches, camp fires.
Low, 17 to 22 per cent	Matches and camp fires.
Very low, 23 to 29 per cent	Duff at edges of camp fires will smolder but not spread much.
Generally safe, 30 per cent and above	None: generally safe from all.

NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

March has been another month of report writing and compilation of data, with Haig and Temporary Assistant Averill devoting all their time to this work. Gisborne has been on detail at Washington throughout the month. Our first experience at having a computer on the job steadily throughout the office season is helping us to clean up two back jobs this winter, namely, Haig's yield and cut-over area studies. But helpful as this is, it makes only a start at catching up on the compilation of the mass of field data we have on hand. There are field records for numerous permanent sample plots dealing with yield, thinning, reproduction and methods of cutting which we have not touched. Most of these records represent 3 and 5-year remeasurements and some of them 10-year remeasurements. We should now have a minimum of 3 computers on the job for about 5 months during the office season.

Haig devoted his efforts chiefly to the western white pine yield study. Complete stand tables are now available for this type, including one showing the dispersion of total board-foot volumes by diameter-class in stands of known average diameter and average composition. This table should be of particular interest in a region in which board-foot yields are of chief interest and a selective, diameter-limit method of cutting already in use on a fairly large scale.

Haig also completed a short article, describing silvicultural developments in the western white pine type since the first Forest Service sale in 1907. Few people even in the region realize the great variety of silvicultural methods that have been employed in cutting white pine stands during the last quarter century and the extent to which the methods now employed are the result of organized research and large scale trial and error. For example, all of the following methods of cutting have been used at some time or other in cutting western white pine stands: (1) The seed tree method, i.e., clear cutting with scattered seed trees usually to be left as standards throughout the next rotation. This method was employed on the first sale in the white pine type and though abandoned for almost ten years after that first attempt, it later became the standard method. (2) Clear cutting with seed blocks. Seed blocks of two to twenty acres in size scattered over the area at intervals of four to twenty chains. Some early sale areas on the Kaniksu Forest were cut over in this manner. (3) Clear cutting on strips, i.e., alternate cut and uncut strips $2\frac{1}{2}$ to 7 chains wide. This method used on a number of early Coeur d'Alene sales. (4) Clear cutting with scattered seed groups. Each seed group was to contain at least 12 to 15 trees of merchantable size, including at least three white pines. The white pines were to be selected from among the smaller and thriftier trees, for under this method they were left for seed insurance rather than as seed-bearers,

the bulk of the white pine reproduction being expected from seed in the duff. (5) Uniform shelter-wood method, the stand to be removed in two cuts. The first cut to remove the bulk of the merchantable volume and start reproduction. The second to remove the remainder of the stand where reproduction was well established and after desirable light increment had been attained on the residual trees. Some of the first sales on the Coeur d'Alene were of this type and many of the very recent sales approach this type due to the present policy of leaving a considerable amount of white fir and hemlock on some sale areas.

The Experiment Station made several important contributions during this period. To give the results of one project: early migration studies initiated by Brewster proved incorrect two early beliefs based on the observation of reproducing burns, namely, (1) that white pine was greatly favored by the presence of a mineral seed bed, and (2) that white pine would reseed abundantly by wind dissemination up to distances of one-half mile. The most interesting outcome of these migration studies, perhaps, was the discovery of the stored-seed theory. J. V. Hofmann carried out his first season of field work on migration studies at the Priest River Station under Brewster and from there went to District 6 to develop the theory in the Douglas fir type. Following this Larsen and later Haig contributed results which have figured importantly in the basic knowledge upon which the present marking practice rests.

Late in the month Weidman participated in a three-cornered presentation of a proposed slash disposal policy for Montana before a joint meeting of the Missoula Hoo-Hoo Club and the Northern Rocky Mountain Section of the Society of American Foresters. The other speakers were H. R. Flint, who discussed the subject from the standpoint of protection, and F. G. Clark of the Montana Forest School faculty, who dealt with the economic aspects. Weidman discussed the relation of slash disposal to maintaining cut-over land productive and proposed a partial disposal method very similar to the one he is recommending in his forthcoming bulletin on timber growing and logging practice in the northwestern yellow pine region.

Weidman outlined the features of this method dealing with the clean-up of slash along rights of way, as well as other routes and points where the risk is great, and the leaving of it with intensive protection elsewhere where the risk of fires starting is low. He discussed also the rate of natural reduction of slash as a menace and the possibilities of bringing a slash covered area safely through the period required for such reduction. There is some question on the part of Forest officers, whether in this exceedingly dangerous fire region, slash can be handled with safety in this way. Many cut-over areas in western Montana, small and large, in both the larch fir and western yellow pine types, have survived 20 to 30 years of such exposure. Others have been swept clean by fires originating in them

or getting into them from the outside. Weidman contended that the fact of such areas burning in the past is not a valid argument that they cannot be protected by the method of partial disposal and subsequent intensive patrol. Intensive protection has never been tried; in fact, most of these areas have received no protection whatever. An appealing feature of partial disposal here is that it can be carried out at a cost but little greater than the 15 cents a thousand feet of cut, which the present Montana law imposes as a maximum, if this amount becomes necessary to reduce slash as a menace.

An interesting feature of the meeting was Professor Clark's proposal that western Montana be designated as a fire district in which property owners, real and personal, should be taxed for the protection of all private and state timber, including cut-over land. This would be analogous to fire protection of private property in cities by municipal fire departments. He referred to systems of this sort in effect in Maine and Pennsylvania. He stated that a 5⅓ mill levy would cover the needs in Montana. Expressing the view that the private owner has no obligation in slash disposal beyond removing a menace, Clark included as a part of public fire protection such special measures of slash disposal as may be needed to prevent the destruction of reproduction and sapling growth, in which the owner has no monetary interest. He held that the differential between slash disposal costs for these two objectives should be borne by the public.

Ranger Thompson reports that at the end of March the season is already well started at Priest River with the grass beginning its growth and alder and many willows in full bloom. Instrument shelters are being set up in the three new fire weather and fuel moisture enclosures and numerous repair jobs are being accomplished in the laboratory building and around the plant in general.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

General

March came in like a lion so far as meetings are concerned, with the annual meeting of the Western Forestry and Conservation Association on March 3, 4, and 5, and the Investigative Committee annual meeting on March 6, 7, and 8. The former meeting brought many foresters and lumbermen to Portland and gave all members of the Station an excellent chance to contact them and to hear the interesting discussions at the sessions. The Director was on the program for a paper on yellow pine slash disposal and also read a paper submitted by Mr. H. B. Shepard on the forest insurance study.

The Investigative Committee meeting occupied four half day sessions presided over by District Forester C. J. Buck for the first time. Preparation of the report following the meeting has consumed a considerable amount of time of several of the Station's staff and was completed just at the end of the month.

Natural Reproduction of Douglas Fir

Preparation of progress reports on these studies was interrupted during the early part of the month by Isaac's assignment to the regional Investigative Committee and later in the month by a short trip to the Wind River Branch Station. In spite of the interruptions the Douglas Fir Seed Tree Survival Report was completed and with temporary assistants the file records of the semipermanent reproduction plots were brought up to date and much accomplished in the compilation of records for the measurement of physical factors study.

Phenology

Early in the month Kolbe started phenological observations on the site of the Portland Civic Arboretum. This area is within three miles of the office which is convenient for weekly attention throughout the growing season. This type of study fits in well with the plan that the city has for this tract of typical cut-over and second-growth land, and it should in time bring about some real cooperation with the park officials.

Mensuration

A set of three plots in a young Douglas fir stand were measured for the third time during last September. Two types of thinnings were made in 1919 in a then 10-year-old stand. One thinning left only dominant trees to an approximate 8x8 spacing, the second maintained an exact 8x8 spacing at the expense of dominance. The repeated measurements have yielded some very interesting results, among which the following are a few examples.

1. Thinning has a very favorable effect upon the health and growth of a stand.

2. A thinning in which only dominant trees are left to an approximate 8x8 spacing is much preferable to one in which an 8x8 spacing is precisely maintained to the detriment of the tree class. This lowering of the tree class in favor of spacing is a handicap which the stand takes long to eliminate.

3. Thinning has no determinable effect upon height growth.

4. Thinning has a decided effect upon diameter growth. In actual number of inches, the plot with the dominants has grown much better than the one containing a mixture of classes, but in percentage increase the second one is slightly superior.

5. The trees of average diameter at the first measurement do not remain average trees in later measurements, but on the whole advance beyond the average size. This is contrary to the usual supposition that an average tree more and more loses caste with passage of time and drops behind.

6. Trees of a single diameter class do not remain in that class but spread out rapidly into a wide range. For instance, an initial diameter group of .25 inches width increased within five years to a group covering a total range of 1.3 to 1.9 inches, and in ten years to a total range of 2.8 to 3.3 inches. Relations of this nature are somewhat disturbing to the application of growth figures to the single tree.

7. The big disadvantage of the thinning, and probably the only one, lies in the development of the lower branches. In the check plot, these branches are already dying out and are all small in size. In the thinned plots the branches still extend almost to the ground and are two to three times as heavy as on the check plot. There is no prospect of immediate natural pruning because the crown has not yet closed in. A large volume production is being counterbalanced by a poorer quality.

8. In total volume above a minimum diameter of 2 inches, the plot containing only dominants is fast approaching the check plot, but the plot containing a mixture of tree classes still lags far behind. The minimum diameter of two inches eliminates a large number of trees on the check plot which are rapidly dying out.

Wind River

Munger, Kolbe, Isaac, and Simson, with two temporary assistants made a trip to Wind River early in the month and did the necessary spring outplanting from the arboretum nursery to the arboretum and the transplanting in the nursery. Seven groups of about twenty trees each were outplanted, a few failed places filled, and several hundred trees transplanted in the nursery. Ten groups of exotic pines grown from seed furnished by the Eddy Tree Breeding Institute were outplanted on logged-off land to test their ability to survive under these conditions.

Forest Survey

Granger, Munger, Andrews and Cowlin attended a meeting of the Forestry Committee of the West Coast Lumbermen's Association called at Tacoma by Colonel Greely for the purpose of discussing the Forest Survey. Methods of adjusting cruises to a common standard, accessibility zones, units of area for publication, and other matters were discussed. The Committee voted to fully endorse the Survey to the timber interests of the Northwest and recommended that timber owners should be urged to cooperate with the Survey by furnishing data on timber cruises, cut-over lands, and related matters.

Andrews and Cowlin spent a week visiting county officials in southern and central Washington getting information on county cruises, status of records on cut-over lands, county ownership records, and maps showing the approximate areas of remaining virgin timber.

A start was made on translating cruise data obtained from private owners for Washington County into types which were placed on the base map of the County. The tentative working plan for the prosecution of the work on national forests was entirely revised, the entire staff spending about a week in discussing this plan. The plan as revamped has been discussed and approved by the District Office.

Arrangements were completed whereby all Fire Wardens in western Oregon have started preparing general type maps for the counties under their jurisdiction. The Office of Maps and Surveys has started production of base maps for all counties west of the Cascades in both States. Maps of all lands cruised by the better type of cruising firms in Oregon have been prepared. The various types for two northwest Oregon counties were planimetered and the types on certain sample strips in these counties were also planimetered so as to get an idea of the per cent of error involved in using strip methods.

The collection of O and C cruise data, and also private cruise data has been continued and lists of the areas cut over in Washington County have been prepared.

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SOUTHERN FOREST EXPERIMENT STATION

General

Several members of the staff attended the Annual Meeting of the Gulf Section of the Society of American Foresters which was held at Baton Rouge. Dr. Ziegler gave a paper "Shortleaf Pine in Farm Woodlands in Northern Mississippi"; Lentz discussed "Erosion in Silt Loam Uplands

of Mississippi"; and Pessin presented the report of the Committee on "Forest Types", of which he is Chairman.

Naval Stores

Regular chipping of all trees in the turpentine tests was begun this month with the exception of the Dukes tract. This tract was burned over by the owner on one of our worst fire weather days and although the trees had been raked, many faces were burned and considerable damage was done to the crowns. So much damage was done by the fire that it was thought best to discontinue turpentining on this experimental area this year.

Owing to the unfavorable weather a very light run of gum was obtained from the first few streaks. Rainfall in March was three times the normal.

Forestation

Longleaf pine flowers were cross-pollinated with loblolly, slash and Sonderegger pine pollen at Bogalusa. Longleaf cones pollinated last year with loblolly and slash, are developing normally and should produce hybrid seed next fall. Observations of planted seedlings, especially of longleaf, as to quality and vigor in relation to initiation of growth in spring seems to indicate that the poorer seedlings are first to start growth. Reexamination of 12,000 trees in experimental plantations and photographing of four and five year plantations were made by Wakeley at Bogalusa.

At Camp Pinchot Bennett looked after the nursery until Gemmer returned the middle of the month from his detail at New Orleans. Seedling counts on various plots were made and a study of Scrub Oak inaugurated to determine growth and development of the oak and how it affects natural reforestation of longleaf.

Management

Many members of the station were at Urania working in second growth old field loblolly pine on the method-of-cutting and mill-scale studies, the latter in cooperation with the Forest Products Laboratory. Miller and Wollin, from the Laboratory, spent the entire month on the mill scale study and Garver and Paul were also there for short periods. Marking, measuring and mapping of trees and the felling, skidding and loading was finished. The tract belongs to the Urania Lumber Company and logs were put through the mill at Urania, approximately 118,000 board feet, (Doyle rule) were cut from 14 acres. The trees averaged around 75 feet in height, 14 inches D.B.H. and 40 years old.

In the method-of-cutting study, five plots were laid out: a clear-cut plot, a ~~large tree~~ selection plot, a small tree selection plot, a ~~diameter~~ limit plot and a check plot. On the first three plots, trees under sawlog size (or about 11 inches D.B.H.) down to ~~six~~ inches D.B.H., will be cut for pulpwood. Hardwoods above four inches D.B.H., on these three plots will be girdled and poisoned. On the diameter limit plot, all trees of 12 inches D.B.H., and over, were cut. Brush on these four plots will be lopped and piled only to the extent of removing it from around the remaining trees, so that in case of fire the burning brush would not kill the trees.

Pathology

Siggers continued his work with brown-spot needle disease of the longleaf. He recently concludes that spraying at one month intervals is too infrequent and allows infection to occur.

Lindgren and Scheffer ran some further preliminary mill tests during the month, using a number of chemicals which had proved effective in laboratory tests in preventing blue stain.

Economics

The Economics staff completed the field work for the financial study of timber growing in Lee County, Alabama, early in the month, and spent the most of the month in working up this report, in revising the general working plan for the Economics Study and in completing the report for Appling County, Georgia. It was found in Lee County that during 1929, 35,740,000 board feet of lumber and 21,296 ties were cut, but it is estimated that in 1930 less than half this amount will be cut. In other words, the county is practically cut out. The average price received for stumpage was $4.00 per M. mill cut. The stand is chiefly a loblolly-shortleaf mixture and growth was very satisfactory, varying with density and site. One old field loblolly stand 26 years old was found to have an average annual growth of 1,022 feet. A loblolly bottomland stand, 61 years of age, had a stand of 30,520 board feet per acre and an average annual growth of 829 board feet. Timber growing appears as a favorable financial venture for the farmer in that county.

Erosion

During the month Munns, Demmon and Lentz made a reconnaissance in Carroll, Marshall, and Lafayette counties in northern Mississippi and encountered some very serious erosion. Later in the month the Erosion staff studied Adams and Jefferson counties, Mississippi. Little erosion was found in Adams and western Jefferson, but half of

Jefferson is badly eroded. Here the loess plays out leaving only a thin layer of silt loam. Land in this section, cleared for cultivation, is farmed for about 8 to 10 years and must then be abandoned due to gully formation. The loess is quite deep in the western part of the county and seems to have prevented erosion.

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SOUTHWESTERN FOREST EXPERIMENT STATION

The coding of data for punch cards has been completed for 8 "intensive" sample plots averaging 10 acres each. All of these records were begun in 1909 and have been renewed at 5 year intervals up to 1929. Records on "extensive" or large plots are not being run through the punch card machine at the present time because the trees were not tagged at the beginning, and individual tree records extend back only 10 to 15 years. It is the plan to compile all records with the punch card machine as soon as they cover a period of 20 years.

A progress report entitled "Recovery of western yellow pine seedlings injured by grazing" has recently been submitted. This report gives a record, supplemented by photographs, of 87 seedlings and saplings examined in 1914, 1920 and 1928. At the time of the original record they were from 7 inches to 5 feet in height and represented different degrees and types of injury. Of those whose original height was 3 feet or more, none have died and the majority have made good recovery. Of those originally in the 1 to 2-foot class, and severely injured, 31 per cent have died and 23 per cent are in such poor condition that recovery is doubtful. Even in the 3-foot class, 50 per cent of those originally recorded as severely injured are now in doubtful condition. On the other hand, those which were uninjured or only moderately injured at the time of the first record are all in good condition, including the 1-foot height class, and nearly all have grown until the tops are beyond reach of sheep. Although all the seedlings were subject to grazing by cattle and sheep throughout the entire period, subsequent injuries have counted for less than the initial ones. This is probably because those which were badly damaged to begin with made very slow growth and therefore remained subject to continued browsing, whereas many of those which were less severely injured grew out of danger in a few years. The general conclusion is that the capacity of a young tree to recover from damage by livestock is closely related to the amount of foliage left and the food reserve. Both of these factors are likely to be more favorable in a large than in a small plant.

Since the above study included no very small seedlings, it has been supplemented by records following the abundant germination of 1919.

Relatively few of these seedlings were disturbed during the first summer, but late in the fall an average of about 10 per cent were bitten off. During the spring and summer of the second season from 30 to 50 per cent were bitten off on heavily grazed sheep and cattle ranges. Up to this time, practically all of the damage consisted of removing the entire crown, seldom leaving even a vestige of leaves, and nearly every seedling thus affected died. Late in the second season removal of the crown was less complete, and it was found that wherever a few leaves remained the seedling had a chance to recover. Very few seedlings were killed outright by grazing injuries after the second year. Many seedlings browsed the first time in the third or fourth year (1921 and 1922) and at irregular intervals since then are still alive but of small size and poor form. The capacity of small seedlings to survive browsing is determined by the amount of foliage left, size and inherent vigor, frequency and severity of subsequent injuries, and natural conditions for growth.

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BRANCH OF RESEARCH - D-2

March Activities

Thirty germination tests were started in the Fremont greenhouse of commercial and experimental seed lots which are to be used in the 1930 spring sowing on the Nebraska. All but four of these lots represent western yellow pine, and the majority are from the special seed trees in the seed-source study.

Most of Roeser's time was given to preparing new and supplemental working plans for the proposed pulp-wood cutting experiment in the spruce-type on the Montezuma and for the Nebraska seed source study, and to revising the original working plan for the study of brush disposal methods in Black Hills western yellow pine.

The original and check reproduction counts made in 1928 and 1929 in the last named study were tabulated and summarized. The results indicate that even where the brush is scattered, a heavy stand of seedlings (in this case about 7600 per acre) may be expected, but as the result of suppression under brush, 1/4 to 1/3 of the original number present are eliminated. It is expected that under this system of brush disposal a more uniform stand will result. The progress of development of the seedling stand will be followed closely for several years to study the effect of the various brush treating methods upon the silvicultural improvement of the soil. Observations on the state of disintegration of the litter and debris will be made annually by the administrative force.

Some time was also spent in assembling individual tree measurements and preparing volume tables for the four thinning blocks in western yellow pine at the working center in the Black Hills. One set of tables remains to be completed before the results of the last remeasurements in this region can be compiled.

Rangers Varney and Leadbeater continued with the tabulation of sample plot measurements, and the computation of periodic increments. This work was completed for Blocks B and C in the Holy Cross spruce-fir type and for the sapling, pole and commercial western yellow pine stands on Blocks A, C and F in the Black Hills. An open March permitted Williamson to make considerable headway in thinning the Fremont plots established last summer by Varney.

April Plans

About the middle of the month the season's field work will be started at the Fremont Field Station. The first task will consist in augmenting the equipment at the type study field stations to the summer standard. This will include the establishment of soil wells at all of the fourteen stations. Before the end of the month, it is expected that the transplanting of the various western yellow pine seedling lots in the breeding study will be undertaken at the Monument Nursery.

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MANUSCRIPTS

ALLEGHENY

"The National Forest Reservation Commission and Forest Research Reserves," R. D. Forbes (For Science)

"Progress in the Research Reserve Program", R. D. Forbes (For Journal of Forestry)

CENTRAL STATES

"Speeding Our Departing Guests", by Ralph K. Day (For Nature Magazine)

"The Importance of Forest Litter in the Germination and Early Survival of Chestnut Oak (Quercus Montana, Willd.)", by L. I. Barrett (For Ecology)

PACIFIC NORTHWEST

"A Method of Constructing Yield Tables for Selectively Cut Stands of Western Yellow Pine", by Walter H. Meyer, March 15, 1930, (Mss report)

"Survival of Seed Trees in the Douglas Fir Region", L. A. Isaac.

"The Effect of Relative Humidity on Short-period Fluctuations in Fuel Moisture Content", A. G. Simson.

SOUTHERN

Nursery Report for Camp Pinchot. Season of 1929.

Working Plan for Study of Relationship of Surface Vegetation and Soil Moisture. February 19, 1930.

SOUTHWESTERN

"Recovery of Western Yellow Pine Injured by Grazing Animals", Hermann Krauch and G. A. Pearson (Progress Report)

CALIFORNIA

"Studies of Factors Affecting the Yield of Water from Watersheds in Southern California", by L. C. Lowdermilk.
(Paper presented before Conference on Research Problems in Consumptive Use of Water and Conservation of Rainfall, etc. Am. Soc. of Civil Engineers, Los Angeles, March 27-28, 1930)

IN PRINT

Mitchell, J. A.	"Interception of rainfall by the Forest." (Jour. For. Jan. 1930)
Munns, E. N.	"Floods and Forests", (Canadian Woodlands Review March, 1930)
Mowat, E. W.	"Mapping of browse areas." (Jour. For. Jan. 1930)
Pearson, G. A.	"The Southwestern Forest Experiment Station", (Arizona Year Book)
" " "	"Arbor Day", (Coconino Sun)
" " "	"Light and Moisture in Forestry"(Ecology Jan. 1930)

Rudolf, P. O. "A Comparison of Several of the Growth per cent Methods of Predicting Growth", (Jour. For. Jan. 1930)

Shirley, H. L. "A Thermoelectric Radiometer for Ecological Use on Land and in Water", (Ecology 11 (1) 1930)

Westveld, M. "Girdling Hardwoods to Release Spruce and Balsam Fir", (Journ. For. Jan. 1930)

" " "Pulpwood Crops in the Northeast", Leaflet No. 57.

Zon, R. and J. L. Averell. "Growth in Swamps Before and After Drainage", (Jour. For. Jan. 1930)

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Annual Trip to Mills of Inland Empire to Collect Production Costs Made During March

During the last half of March Mr. Neff, District Logging Engineer, and Mr. Bradner visited thirty of the band mills within the District. This is an annual trip at which time the production costs are obtained by personal interview from officials of the company. Due to excellent road conditions for this season of the year Neff and Bradner were able to use a government automobile to visit the mills adjacent to Spokane and in northern Idaho. In past years it has been necessary to divide the territory between the two men in order to visit all mills within the allotted time. Traveling by auto Mr. Neff and Mr. Bradner were able to visit most of the mills together as well as to cut down the time of the entire trip. The exchange of information and ideas and the contact and acquaintances made during the trip are an important feature of the annual project. Any plan which enables both of the men to visit each one of the mills is to be preferred.

It was found that a larger number of the plants had begun production earlier in 1930 than was the case a year ago. Regardless of the fact that a concerted attempt had been made to reduce production by limiting the working days to five a week, practically all of the mills made an increase in cut. Eleven identical white pine mills cut 83,885 M feet, or 19% more lumber in 1929 than 1928. Six identical western yellow pine mills cut 15,804 M feet or 6% more in 1929 than in 1928.

The cost of manufacturing lumber in mills cutting fifty per cent and more of Idaho white pine, spruce, cedar, white fir and hemlock averaged $11.41 per M in 1929 as compared with $11.72 per M in 1928. The cost of producing western yellow pine lumber was somewhat higher in 1929 than in 1928, being $10.53 per M as compared with $9.95 a year ago. Manufacturing costs during 1929 ranged from a low of $6.82 per M in a larch-fir mill cutting a large percentage of mining timbers to a high of $14.30 per M in a white pine mill which machined 97 per cent of its products. One plant kiln dried 103 million or 85% of its cut at a cost of $1.45 per M. The largest Idaho white pine mill in the world cut 138 million feet of this species during 1929 out of a total production of 171 million feet. In addition, this mill produced 11,390 M pieces of lath including snowfence, lath and pickets.

The manufacturing costs which are collected in detail, i.e. pond, sawmill, yarding, shipping, selling, general expense, taxes and depreciation, are averaged for mills cutting a majority of one of the more important species. These average figures are used by the Forest

Service in making appraisals and in the many studies where production costs must be known. Photostat copies of the data collected, on which each mill is designated by a key number, are distributed to the companies which have co-operated. The information is considered confidential by the Forest Service.

At the suggestion of several of the operators, 1929 logging costs were collected in more detail than has usually been the case. On this year's sheet the cost of logging will be segregated into the stump-to-car or river cost, the car or river-to-mill haul cost and the overhead cost, and shown along with the total logging cost.

Woods Waste Studies

Field work on the breakage in felling study has been partially completed for the larch-Douglas fir type. Following is a tabulation of the results of that portion of the study made at the camp of the Somers Lumber Company, Lupfer, Montana. There was about 16 inches of snow on the ground at the time of the study, but the timber was not frozen.

Total Gross Scale	Larch & Douglas Fir	190,780 ft.B.M.	Log scale
Total Net Scale	" " "	165,040 "	" "
Scale of Long Butts	7.3%	13,850 "	
Scale of Breakage	.9%	1,720 "	
Scale of Cull and Defect	2.1%	4,030 "	
Merch. waste to 8" top	3.2%	6,130 "	

318 ft. = gross scale per tree
13.5% = total deductions per tree

The loss from breakage was unusually small. Lack of frost in the timber and its small size were mainly responsible for this small loss. Rangers McDonnell and Lillevig of the Blackfeet Forest secured the above data under the supervision of Mr. Anderson.

The results of the depreciation study of chute logs were published in the April issue of The Timberman. Articles on topics of this nature are always of interest to the lumbermen and are usually followed by numerous requests for additional information. We have already received an inquiry from a Wisconsin operator who contemplates starting a logging job in the Engelmann spruce of Colorado.

It is planned to publish the results of the fire depreciation study of Idaho white pine in the next issue of The Timberman.

Census

Considerable progress was made on the editing of returns, correspondence in connection with incomplete returns and other follow-up work throughout the month. Second requests were mailed to 336 concerns in North Idaho and Montana about March 18 and since that date 120 reports have been received.

A recheck of the total number of returns as compared with the total mailing list for Idaho and Montana now shows that the canvass of these two States is 64 per cent completed.

Lumber Prices and Movement

Av. Mill-Run Prices	Annual, 1928	Annual, 1929	January, 1930	February, 1930
Idaho White Pine	$31.09	$34.33	$36.21	$35.21
Western Yellow Pine	24.51	26.17	24.15	24.24
Larch-Fir	18.55	20.29	19.48	18.64
White Fir	18.26	20.94	19.24	17.52
Spruce	23.20	24.23	23.28	24.94

Shipments & Cut	February, 1929	February, 1930
Shipments	129,322	112,996
Cut	97,410	94,592

Miscellaneous Reports

The Fourth Quarter Lumber Prices, Annual Lumber Prices, Retail Lumber Prices, and Cedar Products Prices, were compiles during March by Mrs. Bullard.

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1929 Census of Lumber, Lath, Shingles, Logs, Cooperage and Veneer.-

Of the 2750 companies in the initial lists, 1723 were included in the second request. Replies of one kind or another were received from 535 during the month, bringing the grand total of replies to date to 1531. To date 704 reports have been edited, with an additional 100 completed except for certain missing information.

Survey of Sawmill Waste in the Douglas Fir Region

Mr. Hodgson spent most of the month in lining out and starting the office work in connection with the field work done in February. A third clerk is assisting him with the computations.

In connection with this project the industry was circularized with a questionnaire for the purpose of securing general information regarding the production and present utilization of sawmill waste. A large number of the schedules have been received and Mr. Hodgson, who has been editing them, believes that some very worthwhile data will be secured in this way.

Survey of Logging Waste in the Douglas Fir Region

The Hodgson report has been given a great deal of publicity in the press of the Northwest. The news release summarizing the results of the survey was printed quite generally and the report itself has been used as the basis for editorials by several leading newspapers. A large number of complimentary letters from the local industry and from the forestry profession in all parts of the country have been received.

Felling and Bucking Study in the Douglas Fir Region

The 1930 plan is for Spelman to so organize the field work that at the close of a full field season he will have collected sufficient data to warrant the preparation of a report dealing with the effect of tree sizes on felling and bucking costs, with the report to be published in one of the local trade journals. A few operators in the Douglas fir region are now considering the feasibility of selective logging, by areas or timber blocks. It seemingly has occurred to them that they may at times be logging timber that does not pay its way. A report dealing with the effect of tree sizes on felling and bucking costs will contribute toward the solution of this problem. Working toward a report of this kind in 1930, moreover, will not slow up or otherwise interfere with the general plan of work for this project.

District Investigative Committee

The Committee had its annual meeting during the month. Progress made by the Office during the year fell somewhat short of expectations. With Spelman spending six weeks on forest fire work, field work on the felling and bucking study was not as extensive as planned. And not a little work remains to be done on the utilization studies in the western yellow pine region, although the plan was to bring the two studies to completion during the year.

No new projects are recommended. Work already under way gives an ample program for 1930. Briefly, the program of 1930 lines up as follows:

(1) General Survey of Sawmill Waste in the Douglas Fir Region.- Hodgson, as project leader, will devote all his time to this study. Johnson and Spelman will assist with the field work to be conducted in the fall. Largely to supplement the direct findings of this study, Gibbons plans to devote considerable time to a study of the pulp and paper industry of the Douglas fir region.

(2) Felling and Bucking Study in the Douglas Fir Region. - Spelman, as project leader, will devote the bulk of his time to this study. He will be assisted in the field by Johnson; in fact, Johnson will spend as much time on this study as other work will permit. Gibbons also plans to devote some time to the field work.

(3) Western Yellow Pine Utilization Study. - As has been indicated, this study is still in an incompleted state. The plan is for Gibbons, Johnson and Spelman to spend some time on it, bringing it to completion possibly by late spring.

(4) Oregon White Oak Study. - As in the case of red alder and big-leaf maple, Johnson is making a study of Oregon white oak.

(5) Census. - This work will take the bulk of Johnson's time, and much of Gibbons', until well into June.

The needs of the nation-wide economic survey doubtless will prove to be such as to require a somewhat different handling of the work in the future, possibly widening its scope somewhat.

(6) Price Work.

Western Yellow Pine Utilization Study

Mr. Spelman spent much of his time in the analysis and computation of data on the Mt. Emily mill scale study. The preliminary findings seem to indicate that the quality of the logs was relatively poorer than those sawed in the Shevlin-Hixon study. In the smaller diameter classes the Shevlin-Hixon logs had a noticeably higher percentage of Select and No. 1 Common lumber, all of which points toward a marginal tree size in the Blue Mountain region larger than the marginal size in the Deschutes region.

Publications

Hodgson prepared a paper entitled "Logging Waste; A Challenge to the Pulp Industry of the Douglas Fir Region" which he will present at the spring meeting of the Pacific Coast Section of the Technical Association of the Pulp and Paper Industry, to be held at Longview, Washington, April 5, 1930.

The last section of the report, "The Effect of Tree Sizes on Western Yellow Pine Lumber Values and Production Costs" by Gibbons, Johnson and Spelman appeared in the March issue of The Timberman. The 600 reprints received toward the close of the month are now being distributed where they are likely to do the most good.

MONTHLY REPORT OF THE FOREST TAXATION INQUIRY

March, 1930

The North Carolina study, which was begun in February under the direction of Wager, was expedited this month by the addition to the field force of Assistant Forest Economist Roy B. Thomson, a new member of the staff. Seven temporary clerks were employed, and the services of two county officers have been obtained on a part time basis. Hall spent about ten days in the latter part of the month in the field with Wager and Thomson, assisting in completing plans and in selecting a typical mountain county. So far the work has been conducted in Beaufort County as representative of the Tidewater region and in Chatham County in the Piedmont region. Macon County was selected as the Mountain county which will be studied intensively, but the work will not be commenced there until somewhat later in the season. A conference was held at the office of the Appalachian Forest Experiment Station on March 24 in regard to methods of estimating the amount of growth in the selected counties. Valuable suggestions were obtained from the Experiment Station staff, and arrangements were made to get the further advice of Korstian, Buell, and others in connection with their application.

Two progress reports were completed and sent to Washington for multigraphing: Number 7, Digest of State Forest Tax Laws Enacted or Revised During the Calendar Year 1929, by L. S. Murphy and P. A. Herbert, and Number 8, Methods of Research in Forest Taxation, by R. C. Hall.

A preliminary edition of forty-five tables with definitions and notes which present the data obtained in the New Hampshire study was prepared and is now in process of duplication so that copies will be available to those particularly interested in advance of the publication of a complete progress report.

Pingree returned to duty this month, and resumed work on progress reports dealing with tax delinquency in the Lake States and in Washington and Oregon.

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RANGE RESEARCH

WASHINGTON

Chapline and Campbell attended several of the committee sessions and open meetings at the District Foresters' meeting held during the month in Washington, especially those relating to studies, training, and other features of interest to Research. The meeting also offered an excellent opportunity to discuss with field officers from the Districts the need for Range Research, plans, and ways and means of selecting, developing, and training personnel.

Junior Range Examiner Examination

Twenty-six candidates took the examination for Junior Range Examiner this year. They represent 12 or more schools, as well as the school of practical experience. On the whole there appear to be some excellent prospects for appointment.

Publications

Nelson's manuscript, "Management of Black Grama Grass Range in Relation to Climate and Grazing" was received early in the month and has been started on its way for consideration by members of the Board of Review. This manuscript is a valuable contribution developed from the intensive study of maintenance and revegetation of black grama at the Jornada Range Reserve.

Mr. Fred G. Renner has submitted a considerable number of additions to his bibliography, bringing references practically up to date.

FORAGE INVESTIGATIONS

The biggest single job of the month was the retyping and proof-reading of what is ardently hoped to be the final draft of the general browse bulletin,- 394 pages exclusive of the index. This work has been completed and the manuscript placed in Mr. Hunn's hands. It has been necessary to remake the index, a truly colossal task, and a good start on that has been made.

On the 26th Dayton went over, with Dr. F. V. Coville and Mr. M. W. Talbot of the Bureau of Plant Industry, the English names for the species of the genera Bromus and Hordeum to be used in Prof. Hitchcock's forthcoming manual of United States grasses and to be recommended for the next edition of Standardized Plant Names.

Plant Identification

Sixty-two plants, representing one collection, were sent to the Bureau of Plant Industry in March for determination. 120 plant specimens were mounted for the herbarium, and all cases were poisoned for the elimination of another attack of cigarette beetle. The work on check-identification for various District office herbaria has continued.

SANTA RITA RANGE RESERVE

March 1930

Coronado Range Meeting

On March 9, Supervisor Winn assembled his entire force at the range reserve headquarters in preparation for a four-day conference on fire and range management problems. Supervisor Scott and Assistant Supervisor Lessel of the Gila National Forest, as well as Messrs. Musgrave and Koogler, attended the meeting. Mr. Musgrave discussed the game situation in the Southwest and Mr. Koogler discussed the correlation of fire with grazing on National Forests. A day was spent in the field going over the investigations on the Santa Rita, particular emphasis being placed on the natural revegetation project with discussion of the variable nature of the annual forage crop in both density and volume production as influenced by grazing use and rainfall.

Range Improvements

Late in March, Mr. Ruelas started work on additional water development for his range. This includes an extension of the present pipe lines into both pastures 5 and 15 and the laying of a new pipe line from his home ranch down into the south end of pasture 6. Two new thirty thousand gallon storage tanks will be placed in pasture 6, together with four additional watering rims. When completed, these improvements will greatly facilitate the management of cattle in all three of Ruelas' large pastures.

Range Conditions

Spring rainfall conditions have been unusually favorable this spring and growth of grass, weeds and browse is responding rapidly. With a few additional showers later on the spring forage supply should be excellent. During March general rains occurred throughout southern Arizona and varied from 1.43 inches up to 3.97 inches on the reserve. Since the first of January the rainfall at

Florida Station has totaled 8.75 inches or over twice the normal amount. Much the same condition has existed throughout the mountains adjacent to the reserve so that the underground water supply appears very much better than at any time during the past six years.

Personnel

Mr. P. B. Lister has been transferred from District 2 to the Santa Rita to fill the vacancy created by Mr. Turner's resignation. He arrived on April 1st with his family and will remain in Tucson until the start of the field season. We welcome the Listers - big and little - to the Santa Rita and trust that they may enjoy the country and the work as much as we do.

JORNADA RANGE RESERVE.

Range Conditions

In spite of below average rainfall, the grasses and weeds on the reserve are growing well. .11 inches of rain this month moistened the ground up considerably and many of the weeds are in flower and the grass is getting greener daily.

Offsetting the low rainfall is the low wind movement. Few sandstorms have occurred and though no comparable records are now available it seems probable that the wind movement is considerably below average.

Improvements

The cooperator is completing about six miles of fence cutting off the area where the poisonous weed, Drymaria, is abundant, from the rest of the range. Hereafter, cattle will be allowed to graze this area only when there is no danger from poisoning.

Predictions

Campbell has tried correlating low and high precipitation periods with sunspots. In examining the New Mexico State Agricultural College precipitation since 1850, it was found that at least one serious drought year occurred either simultaneously or within a year after the observed maximum numbers of sunspots, in each of the six sunspot cycles previous to the one completed in 1928. In six of the seven cycles, the precipitation peak was reached from one to four years after the occurrence of minimum sunspot numbers. Clements (Ecology 2:181-188, 1921) places emphasis on the numbers

of sunspots occurring in the maximum, with relation to the associated drought. The greatest number of spots recorded for any maximum is 154 in 1778. He finds that the maxima which correspond to periods of intense drought are characterized by spot numbers in excess of half of the greatest number known. In other words, a critical drought period has occurred in the West since 1858 at each sunspot maximum for which the spot number was greater than 77. This does not mean that drought years have not occurred at other times, but Clement's preliminary examination of the records for the years centering about the sunspot minima shows no general and critical drought throughout the West at such times.

One interesting feature of drought periods in the West is the excess-deficiency balance, which appears to function both for a single region over a period of years, and in part for different regions during the same year. For instance, 1929 had above average precipitation in New Mexico, but was a drought year in much of the Northwest. The same condition was true in 1919.

Since the sunspot maximum for the current cycle was reached in 1928, drought was expected in the Southwest, but the past four years have marked a continuous period of above-average precipitation in Southern New Mexico, with drought in other parts of the West. The fact that the number of spots reached in 1928 was approximately only 76 would lead to the prediction that the drought associated with this sunspot maximum would not be serious. Nevertheless, in view of the fact that periods of sunspot maxima have always had below average rainfall, it seems safe to predict that at least one of the next five years may have below-average precipitation in Southern New Mexico. However, in view of the long drought period at State College from 1915 to 1925, it appears that the present favorable climate may continue a number of years to make up the deficiency.

S. E. Aldous has another idea on the subject. Rabbits are known to have more litters and more offspring in good years. In early February in 1929 he found rabbits with young already to be born. The rainfall in 1929 was above average. This year, up to the last of February he found no rabbits with young and no evidence that they were breeding. Will 1930 be a dry year in the Southwest? Perhaps we will have to class the rabbits with the groundhogs and squirrels as weather prophets.

Rodents Active

In the past two months the rabbits have done considerable damage to the range. They have cut down the grass so as to get to the greenor portions of the stems and the new shoots near the ground. The horse pasture has been hit hardest where there is about 40% of the grass cut down.

Efforts at control have mostly been unsuccessful at this season. The rabbits will not take the poisoned grain at all and will scarcely eat fresh or poisoned alfalfa so that practical control by poisoning is a failure.

Aldous leaves

S. E. Aldous of the Biological Survey, who has been working on rabbit control on the Jornada returned to Albuquerque March 24.

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